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R&D

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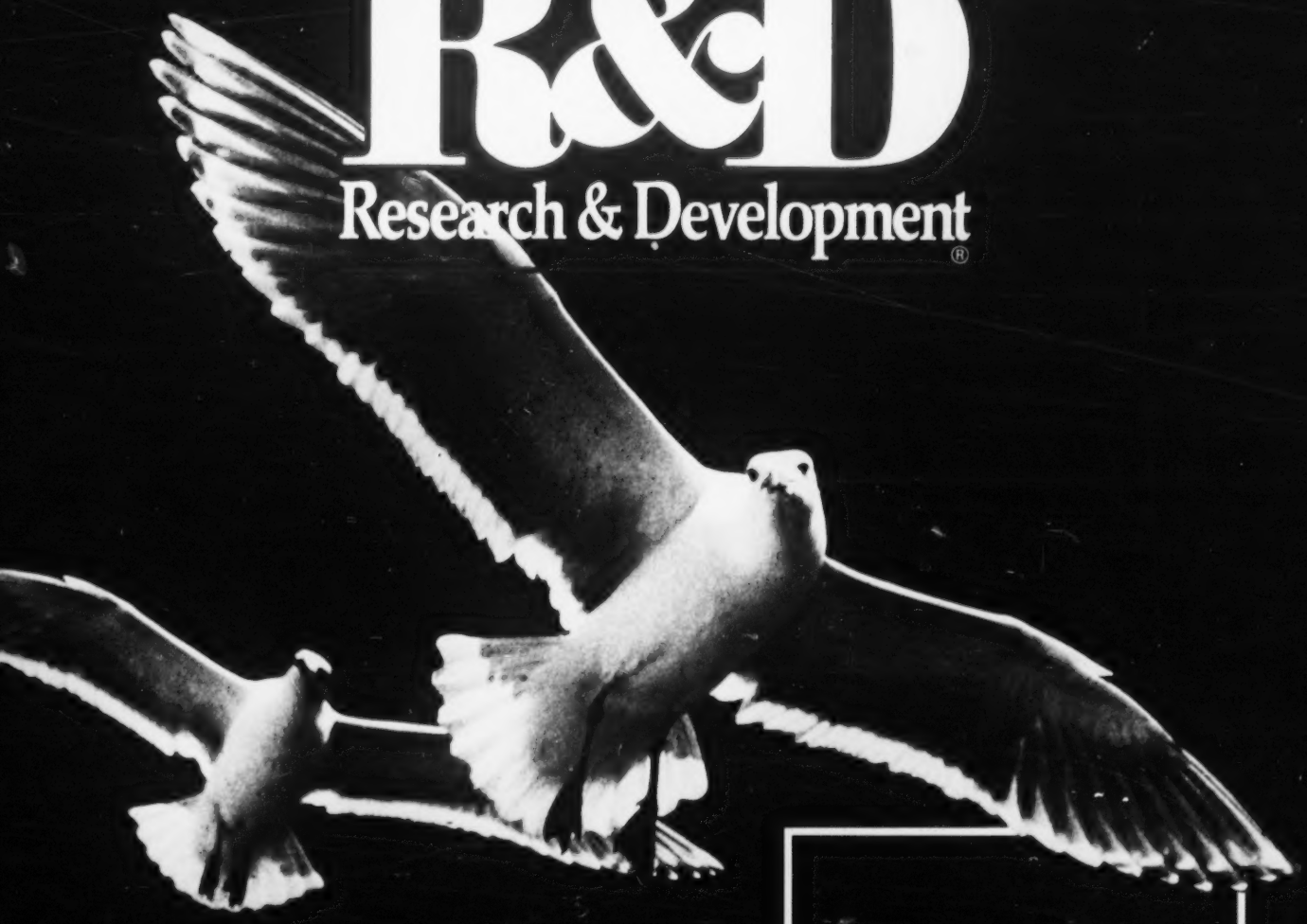

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Spotlight on Danish Technology

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Thermal Analysis Heats Up

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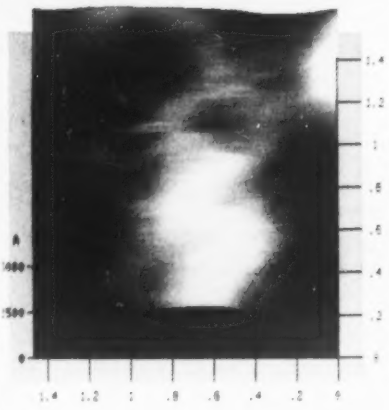

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R&D

The International Magazine of Research and Development

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ABOUT THE COVER Integral shape memory alloys allow the synthetic wing to deform without the need for complex mechanisms. See article page 54. *Photo: Virginia Polytechnic Institute.*

FEATURES

INTERNATIONAL R&D

Spotlight on Danish Technology 33

A special section featuring advances in accelerator systems, biotechnology, chemistry, computer modeling, electronics, environmental research, lab equipment, materials research, pharmaceuticals, telecommunications, and more.

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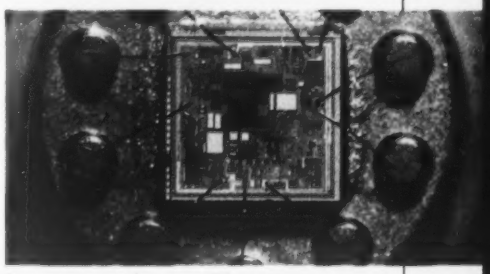
MATERIALS RESEARCH

Smart Materials: Creating Systems That React 54

By combining new electroactive materials, researchers are developing integrated systems that adjust to a changing environment.



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High-tech automation, microprocessors, and software controllers are expanding the uses for thermal analysis instruments.

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An electron-energy prism lets biologists and materials scientists produce 'compositional maps' of cells, metals, and polymers.

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A field called molecular epidemiology goes beyond correlation studies to measure cancer-causing damage to cellular DNA by pollutants.

VACUUM TECHNOLOGY

Silicon MBE Research Races Toward Production 87

Though problems remain, the effort to produce silicon-based devices using molecular beam epitaxy is progressing rapidly.

R&D BUSINESS

Record Number Of Patents Issued

The number of patents issued by the U.S. Patent and Trade Office, Washington, DC, reached record levels in 1991, when 106,882 were issued, according to a recent survey by MicroPatent, a New Haven, CT-based publisher of patent information. This is a 7.1% increase over the 99,275 patents issued in 1990.

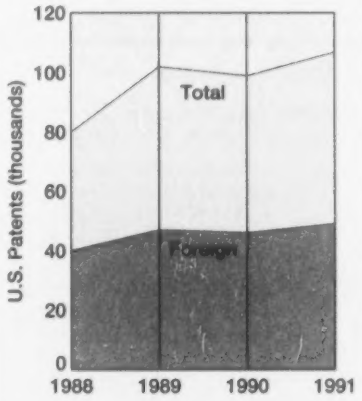
U.S. inventors continued their comeback in 1991, increasing their share to 54.1%, up from 53.4% in 1990. This is the third straight year U.S. inventors increased their share, after losing share to foreign inventors from 1977 to 1988.

Japanese inventors also continued their share improvement of U.S. patents, increasing from a 20.9% share in 1990 to a 21.0% share in 1991. The 22,403 patents that Japanese firms received in 1991 is the most that any foreign country received in one year and nearly equals the annual amount that all foreign countries received in the late 1970s.

The top 10 list of corporations receiving the most patents was mainly a repeat of previous years. There was a slight shuffling in the order of the top five firms, which continued to be dominated by Japanese industrial conglomerates. Motorola broke into the top 10, edging out Siemens, holder of last year's 10th place. Motorola increased its number of patents by almost 50% in 1991 from 427 in 1990.

For more information, call 203/786-5500. □

U.S. Share Rises



Japanese Hold Top Patents

Hitachi	1,188
Toshiba	1,165
Mitsubishi	965
Canon Kabushiki	918
Eastman Kodak	878
General Electric	867
Fuji Photo	766
U.S. Philips	692
IBM	688
Motorola	640

Source: MicroPatent

***U.S. patents awarded** in 1991 increased 7.1% to a record level of 106,882, with five Japanese firms combining for more than 5,000 patents alone.*

Loss of Tax Breaks Hurt U.S. R&D

The U.S. Tax Reform Act of 1986 may have been responsible for a reduction of between $1.4 billion and $2.2 billion in annual R&D spending in the U.S. by 1989, according to a recent study by James R. Hines Jr., a researcher at Harvard Univ., Cambridge, MA.

Prior to 1986, U.S. multinational firms were allowed to deduct all of their domestic R&D expenses against their U.S. income for tax purposes. After 1986, some firms could take only a partial deduction, while other firms were allowed the full allowance.

Hines found that the price-elasticity of demand for R&D allowed more price sensitivity than is typically assumed.

By the way, the tax change resulted in $1.2 billion in additional revenue.

For a copy of the report, ask for Working Paper No. 3930 ($5) from the National Bureau of Economic Research Inc., 617/868-3900. □

Aero Firms' Trade Up, R&D Down

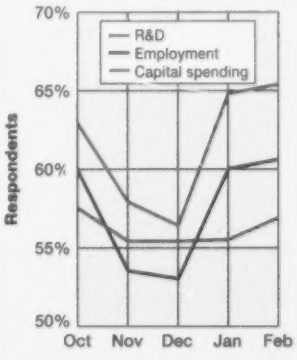
For the sixth consecutive year, the U.S. aerospace industry set a new record in 1990 by exporting $39.1 billion, a gain of almost 22% over the $32.1 billion record set in 1989. This is in contrast to its long-term efforts, as industry-funded R&D dropped by more than $117 million in 1991 to $6.8 billion, according to a new report

SFC Continues in Growth Mode

The market for supercritical fluid chromatography (SFC) systems is forecast to grow nearly 20% annually to $36 million in 1996, according to a study by Strategic Directions Intl., a Los Angeles-based consulting firm.

SFC is still considered a fledgling chromatography method, having been commercialized in 1982. It competes against established HPLC and GC methods.

Confidence Still Up



Corporate executives' confidence in their R&D efforts reached its highest level in nine months, according to a monthly survey by Cahners Economics, Newton, MA.

More than 66% of the survey respondents indicated they would maintain or improve their R&D capabilities over the next few months.

by the Aerospace Industries Assn. of America Inc., Washington, DC.

Government-funded R&D for the aerospace industry is increasing, for the present, with many programs still seeing increases in the proposed FY93 budgets. The 30% drop in new orders from the U.S. government in 1990 was partly responsible for the drop in industrial R&D. U.S. Dept. of Defense appropriations for R&D are estimated to grow by more than 15% in 1992 to $39.9 billion.

For a copy of the report, *Aerospace Facts & Figures, 1991/92* ($25), call 202/371-8561. □

Biotech Bright Spot In U.S. Economy

"Over the next three years, biotech revenues may exceed $40 billion, and the number of professionals will quadruple," says Cynthia Feldman, chair of the bioscience and technology group of Coopers & Lybrand, Boston.

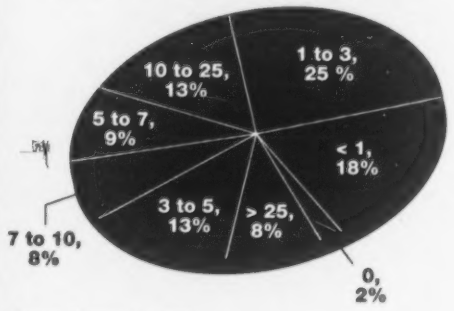
"CEOs in the southwest U.S. have the most aggressive projections," she adds. "By 1995, they expect more than 700% growth in revenues."

Public equity financing of biotech companies in 1991 exceeded $3 billion, their best year yet. Government biotech support is surprisingly strong, with recent proposals to reduce some testing requirements.

Nearly half of all biotech companies have $3 million or less in annual revenues.

Two recent reports cover biotech subjects—*Leadership in Biotechnology*, covering organizational and compensation issues, and *Public Equity Financing in the Biotechnology Industry*. For copies, write to Coopers & Lybrand, Attn: Publications Dept., 1251 Avenue of the Americas, New York, NY 10020. □

Biotech Firms Start Small
Projected 1992 sales (in millions of dollars)



Source: Coopers & Lybrand

NIST Answers ISO 9000 Questions

Which quality management program is the right one for the different ISO 9000 standards? Will the ISO standards help you win a Malcolm Baldrige quality award? Do you even know all the ISO terminology?

These questions are answered in a report from the U.S. National Institute of Standards and Technology: *Questions and Answers on Quality, The ISO 9000 Standard Series, Quality System Registration, and Related Issues.*

ISO standards are already mandated by many governmental bodies in the U.S. and abroad. For a copy (NISTIR 4721) send a self-addressed label to: Standards Code and Information, A629 Administration Bldg., NIST, Gaithersburg, MD. 20899 **R&D**

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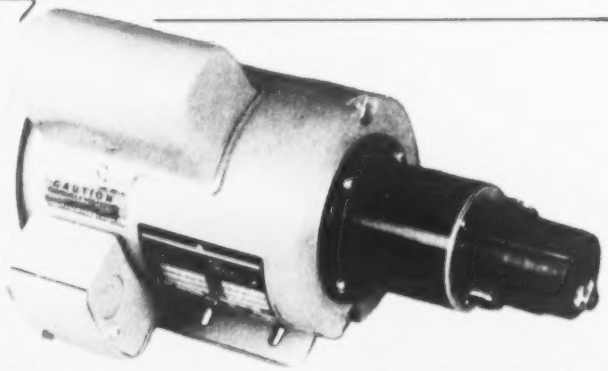

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R&D (ISSN 0746-9179) (GST #123397457), formerly *Research & Development*, is published monthly except semimonthly in February by The Cahners Publishing Company (Subscription includes all issues). Cahners Publishing Company is a Division of Reed Publishing USA. 275 Washington St., Newton, MA 02158-1630. Terrence M. McDermott, President/Chief Operating Officer; Frank J. Sibley, Executive Vice President; Charles E. Moodhe, Senior Vice President/General Manager, Chicago Division; Jerry D. Neth, Senior Vice President/Publishing Operations; J.J. Walsh, Senior Vice President/Finance; Thomas J. Dellamaria, Senior Vice President/Production and Manufacturing; Ralph Knupp, Vice President/Human Resources; Donald C. Knapp, Vice President/Publisher.

Circulation records are maintained at Cahners Publishing Company, 44 Cook St., Denver, CO 80206-5800. Phone: 303/388-4511. **Circulation:** More than 111,104 copies distributed. Second-class postage paid at Denver, CO 80206-5800, and at additional mailing offices. **Postmaster: Send address changes to R&D Magazine, P.O. Box 173377, Denver, CO 80217-3377.** **R&D Magazine** copyright 1992 by Reed Publishing USA. Robert L. Krakoff, Chairman and Chief Executive Officer. **Subscription rates** for nonqualified people: USA, 1 yr $59.95, 2 yr $104.95; Canada, 1 yr $101.60, 2 yr, $203.25 (Canadian rates include 7% goods and services tax.); Mexico, 1 yr $94.95, 2 yr $189.95; all other countries, 1 yr $114.95, 2 yr $214.95; air mail surcharge, 1 yr $65, 2 yr $130. Single copies are available for $15. Product Source is available for $50. Address all subscription mail to **R&D Magazine** 44 Cook St., Denver, CO 80206-5800. Include zip code and, for change of address, copy of old label. **Research & Development** is a registered trademark of Reed Properties Inc., used under license.

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R&D SOFTWARE

Signal Qualifier With Flaw Detector

The Signal Qualifier software module adds signal processing capabilities to conventional analog flaw detector functions. This makes the company's PC-based TestPro NDE system a true digital flaw detector system.

Infometrics **Circle 342**

HP MOTIF Version Of Point & Click

The HP MOTIF version of the company's PV-WAVE Point & Click runs on the HP/Apollo 9000 Series 700 workstation. PV-WAVE Command Language—the sister product of Point & Click—runs on HP/Apollo 9000 Series 300, 400, and 700 platforms.

Precision Visuals **Circle 340**

Process Plant Simulations

The SIMUCEL package provides a powerful way of dynamically simulating continuous and discrete activities of process plants in industries such as chemicals and chemical-related products, lubricants, paint, rubber, and food processing. The program helps in operating today's plants in an increasingly competitive market.

Cellier Corp. **Circle 343**

Data Acquisition Demo

The demo of EASYEST LX shows the capabilities of this PC-based, icon-driven data acquisition, graphics, and analysis package that merges deluxe setup and testing tools with a novel, no-hassle method of application development.

Keithley Asyst **Circle 347**

Development Demo

A free demo program gives a comprehensive overview of the LabWindows 2.0 software development system for programmers using C and BASIC for data acquisition and instrument control applications. The demo gives a guided tour of the software.

National Instruments **Circle 344**

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David's Designs **Circle 346**